Mr. Spear's Report to the Local Government Board on an outbreak of Diphtheria in the Dingestow Registration Sub-district of the Monmouth Rural Sanitary District.

George Buchanan,
Medical Department,
October 26th, 1888.

The Dingestow Registration Sub-district is a wide and sparsely populated area, lying north and north-west of the town of Monmouth. It comprises 16 parishes, with populations ranging from 100 to 700; covers 45,862 acres, and contains a total population, according to the last census, of 4,920. Its surface is markedly undulatory, and in most part well elevated, with a general inclination towards the south. Two small rivers, the Monnow and the Trothey, with their tributary streams, drain it, flowing south and east to their junction at Monmouth with the Wye. Geologically, it consists of the old red sandstone formation, with cornstones, the surface soil varying from a rich deep loam to stiffish clay, but in the latter case mostly with a porous rubbly sub-soil. Here and there the lower levels are occasionally flooded from the small streams, which rapidly gain strength in heavy rain but as rapidly subside. A luxuriant growth of trees, found especially often around the little hamlets, doubtless adds to the humidity of the atmosphere, while in the winter the condition of the by-roads which form the approach to the cottages, contributes to a prevailing dampness.

The cottages are scattered, most of them standing in their own little plots of garden ground. Many of them, I am told, were built by the occupiers, or the forefathers of the occupiers, who "squatted" upon the land, and afterwards paid a small toll to the lord of the soil. The cottages are generally very small, and in many cases are in a bad state of repair. The stone or brick floors and the walls show obvious signs of dampness, and where the floors are boarded, the wood is often laid upon the bare earth. Surface paving and drainage around the cottages are generally wanting, so that a sodden condition of surroundings is the rule. Sewage is allowed to make pools in the vicinity of the dwelling, or to flow into some water course, often silted-up and stagnant, close by; and, where animals are kept, the close proximity of cow-sheds, pigsties, &c., and the absence of proper drainage, lead to much additional offensiveness. Privy accommodation is of the roughest and most primitive description, but is generally provided at some distance from the dwelling. Water is commonly obtained from some spring or "runner" in a neighbouring field or woodland fairly removed from habitations; occasionally from wells sunk in sewage sodden earth. In dry summers many of the sources, it is said, fail.

Personal intercourse between certain of the small communities that occupy this area is very close. In the parishes of Dingestow, Tregare, and Penrose, on the west, where diphtheria has recently prevailed, I found that a large proportion of the inhabitants were nearly related, either by birth or marriage, and often by both. A little further geographical separation is, on the other hand, sufficient to stop all gregarious tendency. Between the villages I have

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mentioned, for example, and Llanvihangel, Hendre, and Llangattock, in the centre of this Registration sub-district, or between the latter and Skenfrith, Welsh Newton, and Whitchurch on the north and east, there is little in common. Except for special occasions of fairs, markets, and the like, intercommunication may be said to be exceedingly localized; but, within the narrow limits of this localization, very close.

In this inquiry interest centres in the western parishes of the sub-district: Dingestow (population 185), Tregare (population 281), and Penrose (population 302); an area bounded on the south by the parish of Ragland in the Trelleck sub-district of the same Union, and on the west by outlying parishes of the Abergavenny Union. Although scattered cases of diphtheria occurred elsewhere, it was in this south-western corner of the registration sub-district that the epidemic prevalence of the disease occurred.

The Medical Officer of Health, Dr. Willis, has at different times reported this to be the healthiest portion of the Union; and, so far as the general death-rate is concerned, the low average of sparsely populated rural districts has been maintained. On two occasions in recent years, however, Dr. Willis has reported the prevalence of *sore throat* in this neighbourhood; and, whether it is related to the climatic or sanitary conditions I have described, or to heredity (it will be remembered how common I found intermarriage in this community to have been), it is certain that the population are much subject to a special form of this affection. It is not only that sore throat resembling erythematous or follicular tonsillitis (a complaint so often found in connexion with diphtheria outbreaks, and chiefly amongst children) is spoken of, but distinct histories of phlegmonous tonsillitis, with the formation and bursting of an abscess internally, were many times given. Both amongst medical men practising in the locality and amongst the cottagers the term "quinsy" is in general use, and serves to describe one of the common diseases affecting adults of the locality. It is spoken of frequently as occurring in the same individual, and occasionally as specially affecting members of the same family belonging to different generations. It is a disease recognised generally, I believe, as one peculiarly subject to hereditary predilections; what appeared to be remarkable in this district was that it should be so common.

In the parish of Dingestow, some two miles north of Ragland, there stands, for the most part on an elevated site, a straggling group of some 32 cottages. Of these, during the last four months of 1887, seven were invaded by what appeared to be true diphtheria, judging from the immediate clinical appearances that characterised the disease and from the observed sequelæ; and in three other houses there were cases of severe sore throat as to the exact nature of which there is more doubt. In January and February 1888, four families were invaded by definite diphtheria in the neighbouring parish of Tregare, the sufferers being acquaintances or relatives of those previously infected in Dingestow; and two other families in January, in Penrose, there being a probability in these cases also of connexion with earlier attacks.

In two cases, at least, the disease seems to have spread from this western locality to neighbouring parishes. A boy at Llanvihangel, in the central part of the Dingestow registration sub-district, died on October 17 of what was registered as "acute pharyngitis, cellulitis of neck." The medical man who certified had only seen the case just before the fatal termination, and he regarded it afterwards as one of diphtheria. A brother fell ill of sore throat a few days later, but no further extension of the disease in this parish would seem to have occurred. A few days before the first seizure in this family an aunt living at Dingestow (Margaret P., to whom I shall again have to refer), who was just recovering from an attack of the prevailing malady there, visited this house, and the boy had, moreover, on one occasion at least just before visited his sick aunt. It may reasonably be inferred, therefore, that infection in this case was conveyed from Dingestow.

In December and January three children of a family in the village of Ragland suffered. The first to be attacked was a boy who had been staying at Dingestow in a house where, in November, a case of diphtheria occurred.

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No extension beyond this household appears to have taken place at Ragland, although children from the infected family continued to attend the elementary school.

As to the origin of diphtheria at Dingestow, the evidence is very meagre; it is even impossible to identify with certainty the first case that occurred. About the middle of September a child, Elizabeth M., living in one of the 32 cottages above referred to, suffered from sore throat; a brother was similarly attacked early in October, and a sister and the mother suffered in January and February respectively of the following year. The history of the childrens' ailments is very incomplete, and no medical assistance was obtained. So far as it goes, it favours the view that the disease from which they suffered was diphtheria; the mother's case is said to have been one of quinsy.

On or about September 13th a man named Alford was attacked by severe sore throat. He was one of a family of three adults, living near Dingestow, but in the Ragland parish, and was employed as carter, &c., to a builder, whose stables were situated amongst the collection of 32 cottages at Dingestow. He was confined to bed two or three days, and was away from work a week, afterwards suffering from weakness, &c., but with no distinct evidence of paralysis. His mother, living with him, had a slight attack of a similar character a few days later.

About September 20th a young woman, Margaret P., living with a nephew in a small cottage standing just opposite the stables where Alford worked, sickened with what there is little doubt was diphtheria, although spoken of at the time as quinsy. Her nephew fell ill on October 14th, and another nephew, living at Llanvihangel (the fatal case already spoken of), on October 12th. The history of all the subsequent cases in the three parishes of Dingestow, Tregare, and Penrose, is not wholly inconsistent with a theory of continuous infection, starting with Margaret P., and extending through a widening circle of relatives and acquaintances, although there are certain difficulties in the acceptance of this simple explanation.

Respecting the sanitary condition of the three cottages referred to above, there were defects of drainage associated with each, but in each case dampness was the most marked defect. In the cottages occupied by Alford and Margaret P. the dampness was extreme.

The sequence of cases during the epidemic prevalence of the disease was as follows:—

TABLE I.

		Total.	1887.				1888.		
			Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Family invasions		15	1	3	3	2	4	2	—
Cases		30	1	6	5	2	11	5	—
Deaths		7	—	1	—	1	4	1	—
Severe sore throat	Families	7	2*	1	—	1	2	—	1
	Cases	12	3*	2	—	1	4	1	1

* The cases of Elizabeth M. and of the Alfords (mother and son).

[With two exceptions, the family invasions noted above include only those that occurred in one or other of the three western parishes; the exceptional cases being the two already referred to as originating in Dingestow. A few isolated cases occurred elsewhere, as I shall presently explain.]

A classification of these attacks, according to age and sex, gives the following results :—

TABLE II.

——	Total.	Total.		1 to 5.		6 to 10.		11 to 13.		14 to 16.		17 to 30.		30 to 50.		50 and upwards.	
Diphtheria.		M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Initial attacks in families	15	10	5	—	—	1	—	2	—	2	—	2	2	3	3	—	—
Secondary attacks -	15	9	6	1	2	4	2	1	—	2	1	1	1	—	—	—	—
Sore Throat.																	
Initial attacks - -	7	5	2	1	—	—	—	—	1	—	—	1	—	3	1	—	—
Secondary attacks -	5	1	4	—	—	—	1	—	—	1	—	—	—	—	1	—	2

Particulars of the fatalities are given below :—

TABLE III.

Date.	Registered Cause of Death.	Sex.	Age.	Locality.	Remarks.
1887. Oct. 17	Acute pharyngitis; cellutitis of neck; exhaustion.	M.	13	Llanvihangel -	Nephew of Margaret P.
„ Dec. 27	Quinsy; erysipelas	M.	47	Dingestow -	Brother-in-law of Margaret P.
1888. Jan. 15	Quinsy - -	M.	49	Tregare -	One family (relatives previously infected at Dingestow).
„ Jan. 21	Diphtheria -	F.	5	Do. -	
„ Feb. 6	Croup - -	M.	17 months	Do. -	
„ Jan. 19	Diphtheria -	M.	36	Do. -	The mother of the child nursed the man.
„ Jan. 28	Quinsy - -	F.	4	Penrhos -	

In none of the cases in which death was ascribed to quinsy did it appear that any abscess had actually formed; in each case death occurred within eight days, or less, of seizure. In one, moreover, a second medical opinion attributed the death to diphtheria, and there was history of the formation of a distinct false membrane over the fauces and lips. In all the fatal cases the attacks were associated with others, either earlier or later ones, that were recognised as diphtheria.

Of the non-fatal cases, speaking of those that I have included under the head of diphtheria, the history again appears to be sufficiently distinctive of the specific disease. A membranous exudation on the tonsils and fauces is spoken of in several cases; marked constitutional disturbance (commencing with chilliness and occasionally with a rigor; temperature rising to 102° and 103° F.; occasional slight nocturnal delirium, &c.) was generally present; and in several cases the characteristic sequelæ of the disease were observed. One child returning to school after an attack had to be excused on account of his absolute inability to read the printed page; another showed similar although less complete inability. In other cases, of adults, difficulty of swallowing during and after convalescence; return of food through the nostrils, altered voice, defective vision, and various muscular weaknesses, were spoken of.

To summarize the evidence obtained: The disease epidemic in these three western parishes appears to have been true diphtheria of the severe croupous variety. As to origin, the evidence does not afford ground for a safe conclusion. In the progress of the disease certain phenomena well worthy of careful study were exhibited. Contrary to common experience, and notwithstanding what appeared to be ample opportunity, the congregation of children in schools had no material effect upon the epidemic. Adults suffered disproportionally, and under circumstances that suggested some other cause for their infection than personal contact, but whether this unusual experience was due to the greater exposure of adults to risk of some other mode of

infection, or to some peculiar predisposition on their part, cannot be satisfactorily determined. I find some significance in this peculiarity of incidence upon adults, and have put certain considerations on the subject among the records of the department.

Apart from the little epidemic outbreak in the three western parishes, cases of sore throat (certain of them probably diphtheritic), "croup," and the like have occurred in other parishes of the rural sanitary district. Such cases, most of them being isolated, occurred in a more distant part than that hitherto referred to of the parish of Ragland: at Hendre, at Lydbrook, at Welsh Newton, at Yorkley, Yorkley Wood, and Whitecroft, and at Llanlwyd. In the parishes of Skenfrith and Llanvihangel cases of sore throat associated with a smart outbreak of scarlatina were observed. In Llanlwyd, a very damp and low-lying locality, there were several cases of sore throat amongst children in adjacent houses. Those that I saw, however, could not be distinguished from simple erythematous or follicular tonsillitis, nor had any paralytic symptoms followed others of earlier occurrence. Amongst these outlying cases three deaths, registered as from "croup," occurred. I excluded them all from consideration in dealing with the epidemic outbreak. Inquiry failed to show any connexion between them, and the localities in which they occurred were far removed.

In making these collateral inquiries it was seen that the sanitary condition of other parishes besides those involved in the epidemic disease was in certain respects unsatisfactory. Many of the cottages were found to be damp and dilapidated and dirty, and a few overcrowded. Nuisances arising from the improper disposal of liquid sewage are very common, and privy accommodation is often of the rudest and most objectionable kind. Water supplies in many cases are insufficiently accessible, and unprotected against surface pollutions. An enormous amount of sanitary work, that, from the circumstances of the scattered population, can in most cases only be carried out in small instalments and in detail, is required; the population, moreover, is of the kind that needs close supervision, and the Sanitary Authority should consider whether, with the very wide area, comprising some 83,000 acres, under their jurisdiction, the services of a single inspector of nuisances is sufficient. To me it seemed that more constant supervision, and a more minute application to the work of improvement were required. I may specially refer to the villages of Skenfrith, Lydbrook, Whitecroft, Yorkley, and Ragland, as amongst those to which attention of the kind I have spoken of is specially needed.

The Authority have made no provision for the isolation of cases of infectious disease, nor have they any disinfecting apparatus. When diphtheria broke out chemical disinfectants were supplied to the infected families and were used under the direction and superintendence of the Medical Officer of Health and Inspector of Nuisances.

JOHN SPEAR.